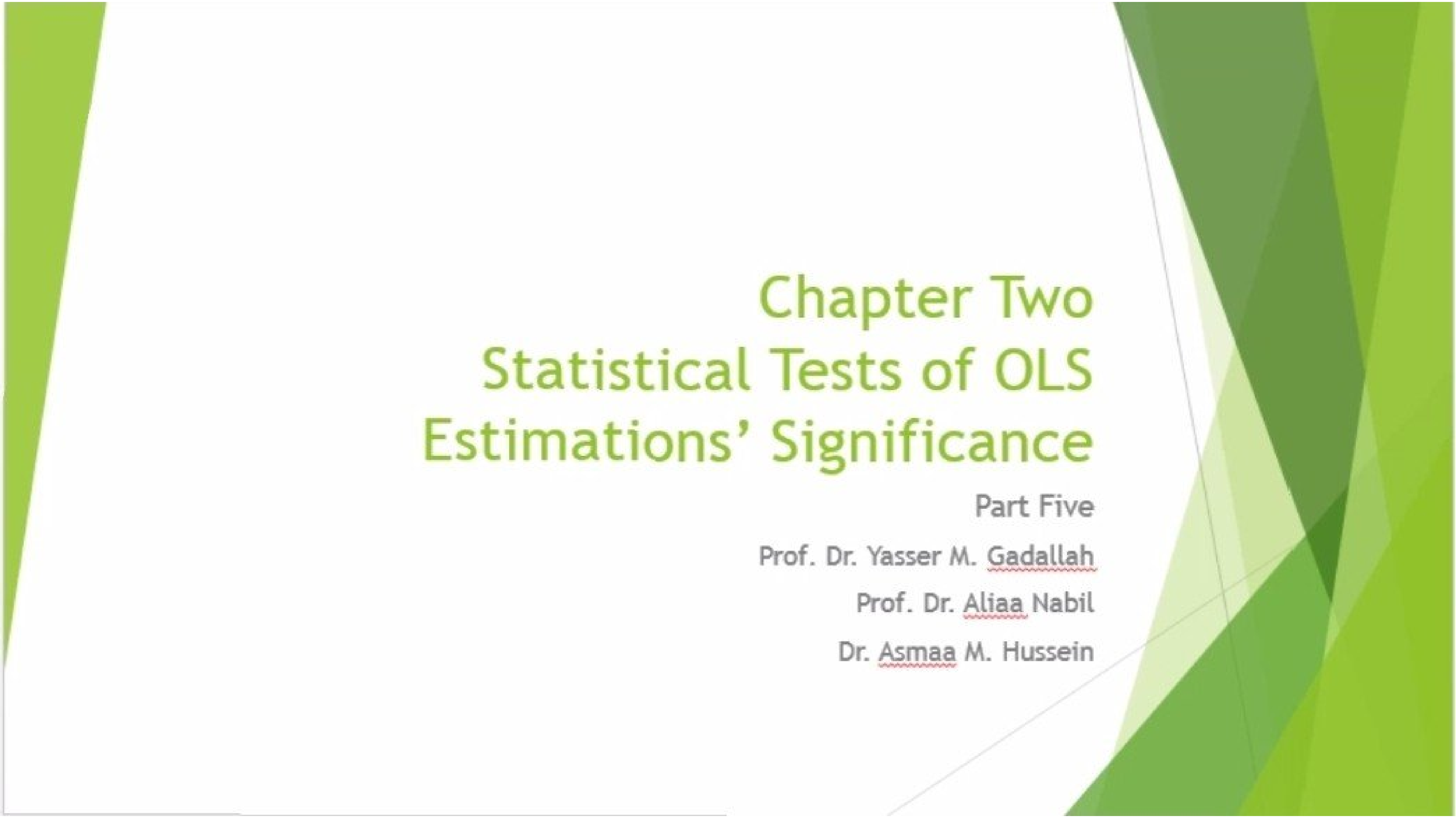

Chapter Two

Statistical Tests of OLS Estimations’ Significance

Part Five

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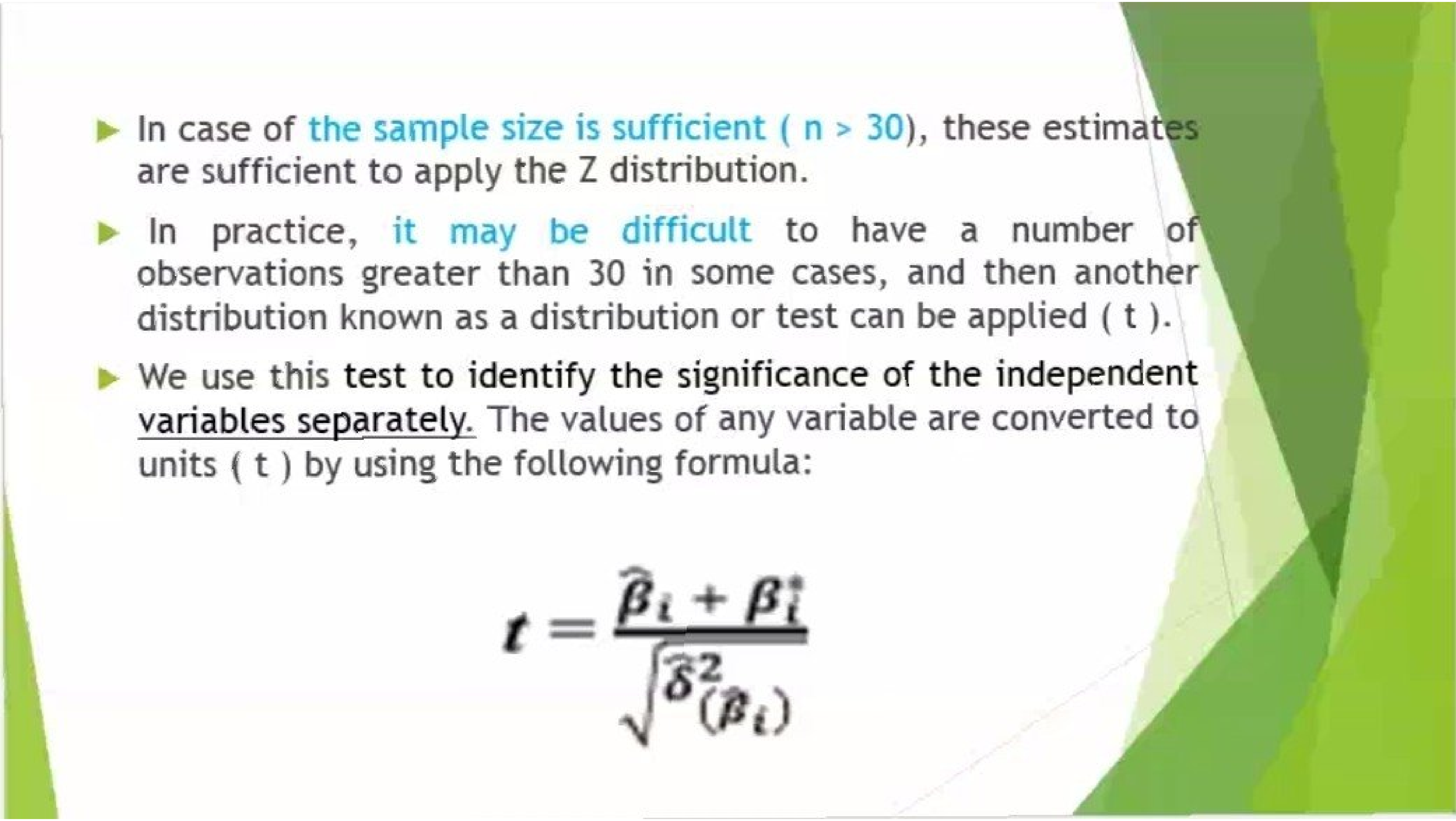
2/4 Test of Independent Variables' Significance:

This point focuses on testing the significance of each independent variable in explaining the change in the dependent variable.

In econometric applications, the true variance of parameters $\delta^2_{\hat{\beta}_0}$ ،$\delta^2_{\hat{\beta}_1}$ ،...... ،$\delta^2_{\hat{\beta}_K}$ is unknown. This is because they include a true variance to random error term δ^2_{μ} which is of course also unknown, and therefore may use unbiased estimation $\hat{\delta}^2_{\mu} = \Sigma e^2/(n - K)$ and getting estimates of the parameters variances .



- In case of the sample size is sufficient (n > 30), these estimates are sufficient to apply the Z distribution.
- In practice, it may be difficult to have a number of observations greater than 30 in some cases, and then another distribution known as a distribution or test can be applied (t).
- We use this test to identify the significance of the independent variables separately. The values of any variable are converted to units (t) by using the following formula:

$$t = \frac{\hat{\beta}_i + \beta_i^*}{\sqrt{\hat{\delta}^2_{(\hat{\beta}_i)}}}$$

[redacted]

Whereas:

$\widehat{\boldsymbol{\beta}}_i$	Fitted value of β_i using OLS
$\boldsymbol{\beta}_i^*$	The hypothetical value of β_i
$\widehat{\delta}^2\,(\overline{\boldsymbol{\beta}_i})$	The estimated variance of β_i (from regression)

[redacted]

The null hypothesis can be formulated as follows:

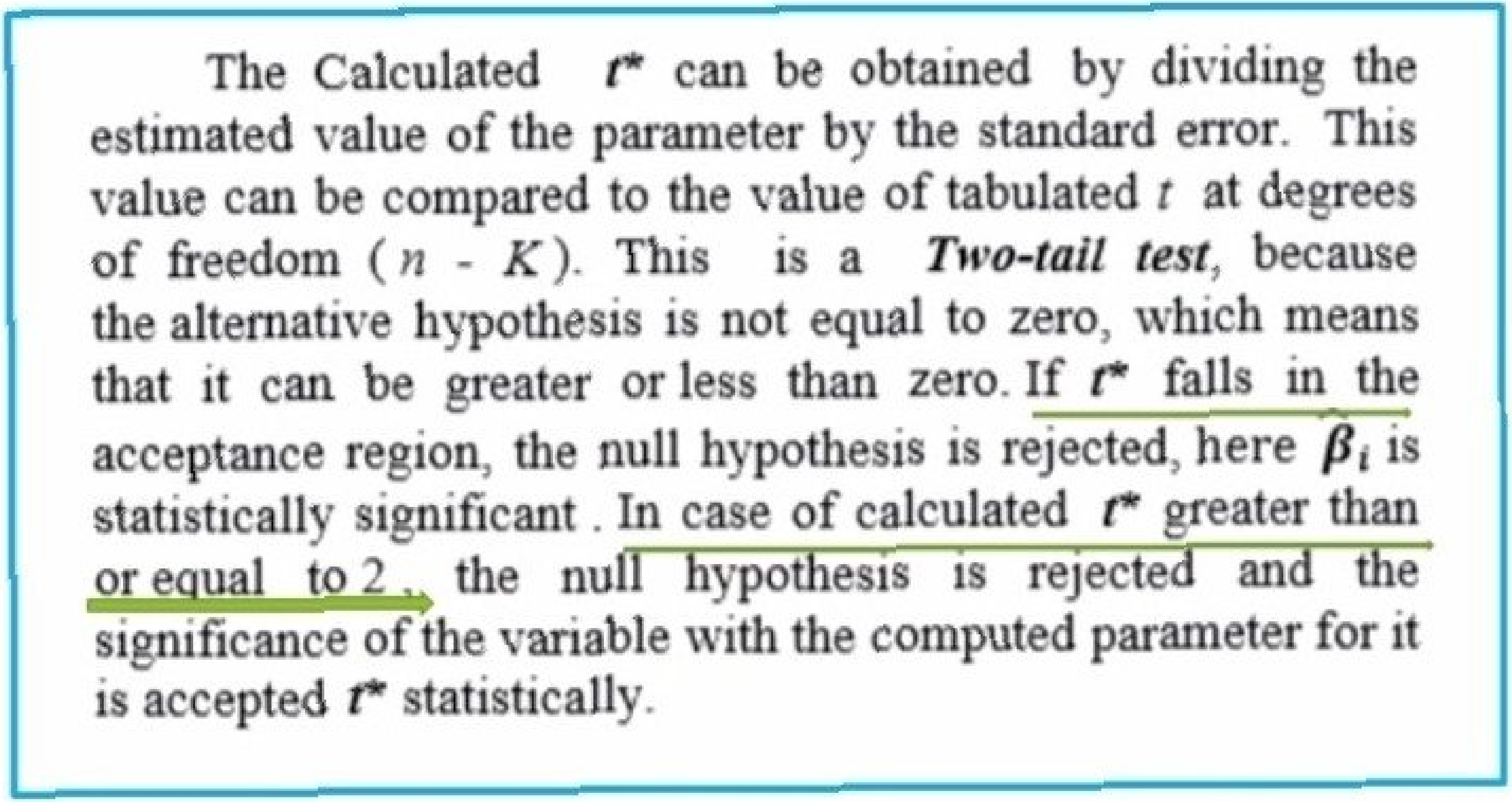
$\boldsymbol{H_0 : \beta_i = 0}$

The Alternative hypothesis:

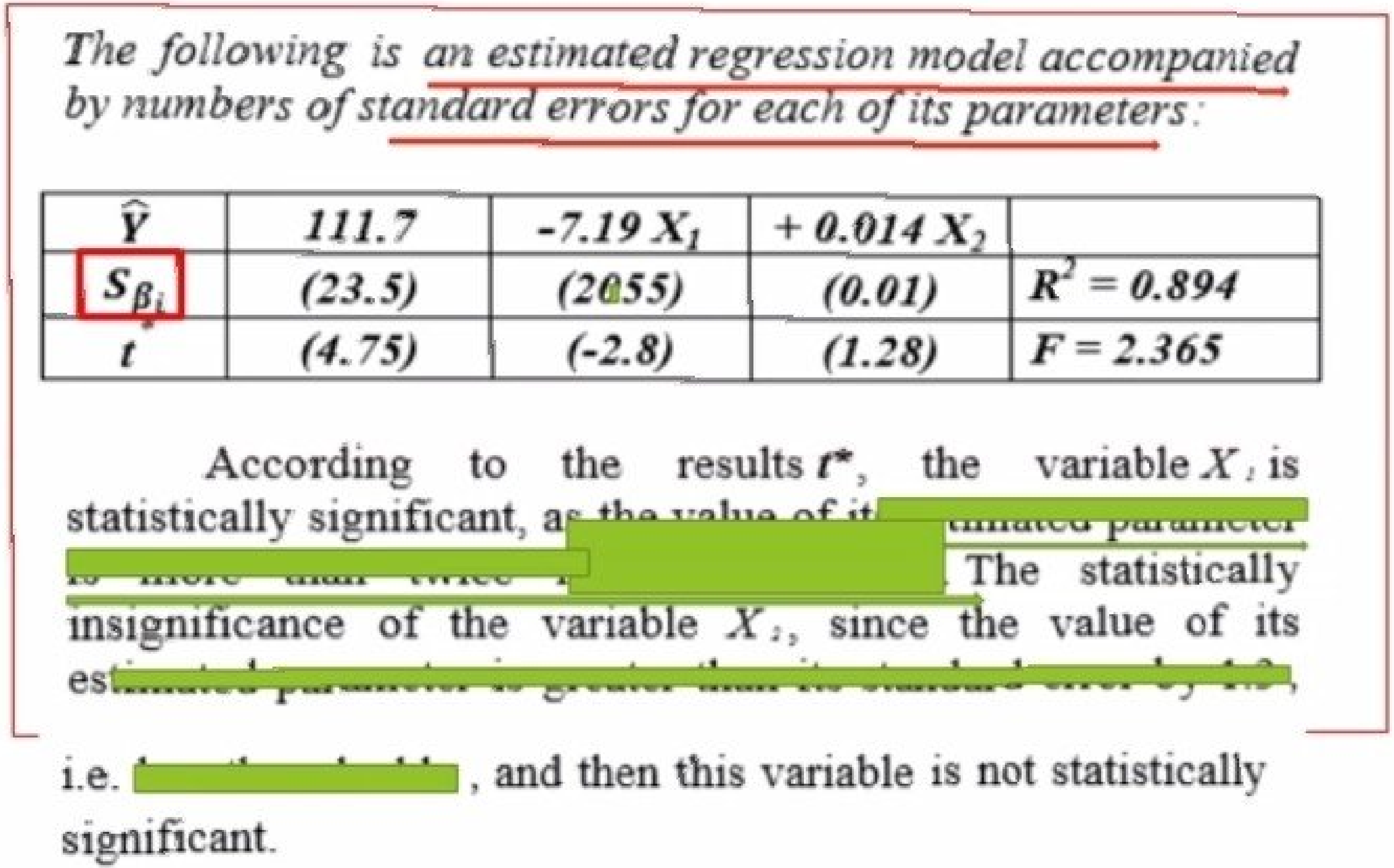
$$H_1 : \beta_i \neq 0$$

Then:

$$\boxed{t^* = \frac{\widehat{\beta}_i}{\widehat{\delta}_{(\widehat{\beta}_i)}}}$$



The Calculated t^* can be obtained by dividing the estimated value of the parameter by the standard error. This value can be compared to the value of tabulated t at degrees of freedom ($n - K$). This is a ***Two-tail test***, because the alternative hypothesis is not equal to zero, which means that it can be greater or less than zero. If t^* falls in the acceptance region, the null hypothesis is rejected, here $\boldsymbol{\beta_i}$ is statistically significant . In case of calculated t^* greater than or equal to 2 , the null hypothesis is rejected and the significance of the variable with the computed parameter for it is accepted t^* statistically.



The following is an estimated regression model accompanied by numbers of standard errors for each of its parameters:

$\hat{Y}$	111.7	-7.19 X_1	+ 0.014 X_2	
S_{β_i}	(23.5)	(2.55)	(0.01)	$R^2 = 0.894$
t^*	(4.75)	(-2.8)	(1.28)	$F = 2.365$

According to the results t^*, the variable X_1 is statistically significant, a[redacted] The statistically insignificance of the variable X_2, since the value of its es[redacted],

i.e. [redacted], and then this variable is not statistically significant.